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EXAMINER

UMEZ ERONINI, LYNETTE T

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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1765

2A

DATE MAILED: 06/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/361,980

Applicant(s)

ITO ET AL.

Examiner

Lynette T. Umez-Eronini

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4, 7-11, 26, 27, 33-38 and 41 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-4, 7-11, 26, 27 and 33 is/are allowed.
- 6) ☒ Claim(s) 34-38 and 41 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ 6) ☐ Other: ____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 34 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The limitation, "wherein a length of the masking film covering the metallic film in the opening is controlled in association with a side-etching amount of the metallic film during the etching, is not supported by the Specification.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 34, 35, 36, 37, and 38 are rejected under 35 U.S.C. 102(b) as being anticipated by Ruggiero (US 4,878,770).

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Ruggiero teaches a method of etching a metallic film. As pertaining to claims 34, 36, and 38, Ruggiero also teaches, "In the first process, . . . a substrate **20** . . . first is provided with covering layers of thin film material **24** such as Silicon Chrome (SiCr), and barrier material **24** (same as applicants metallic film) such as Titanium Tungsten (TiW). . . ." (column 3, line 22-42, FIGS. **2A** and **2B**), which reads on,

forming a metallic film;

"Next a layer of Aluminum is laid down over the entire are of the substrate, and covered with photoresist" (column 3, lines 43-45), which reads on,

forming a conductive film on the metallic film, the conductive film being different substance form the metallic film;

"A masking operation follows, . . . to remove the delineated portions of Aluminum, leaving the interconnect conductors **28** (**FIG. 3**). . . **FIG. 3** shows the photoresist **30** still covering the non-elected portions of Aluminum. The barrier layer **24** then is etched away (as by wet-etchant such as H_2O_2) in the regions not covered by the photoresist **30**" (column 3, lines 45-56), which reads on,

forming an opening in the conductive film to expose sidewall of the conductive film and a portion of the underlying metallic film through opening;

forming a masking film over the conductive film, the masking film having a pattern which exposes a part of the portion of the metallic film in the opening with the sidewall of the conductive film covered; and

etching the metallic (TiW barrier) using the masking film as an etching mask, the etching including wet etching.

Since Ruggiero teaches, "A masking operation to establish the interconnect pattern for the IC" (column 3, lines 45-46), which reads on, forming an opening through the conductive (Al) film to expose the metallic (TiW barrier) layer and etching the metallic film, as in the claimed invention, then using Ruggiero's etching method to etch the same materials in the same manner as that of the claimed invention would inherently result wherein a length of the masking film covering the metallic film in the opening is controlled in association with a side-etching amount of the metallic film during the etching, as claimed in the present invention.

Since Ruggiero's forms and etches a different conductive and metallic film in the same manner as that of the claimed invention, then using Ruggiero's method of etching these materials would inherently result in an ionization tendency of the conductive film being larger than that of the metallic film, **as in claim 35** and the ionization tendency of the metallic film is larger than that of the resistive film, **in claim 37**.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ruggiero (US '770) as applied to claim 34 above, and further in view of KAWASAKI STEEL CORP [KAWI] (English Abstract of JP 04157723 A).

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Ruggiero differs in failing to teach the etching includes dry etching prior to the wet etching, **in claim 41**.

KAWI teaches dry etching an aluminum film before wet etching (Abstract).

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Ruggiero by using KAWI's method of dry etching before wet etching for the purpose of selectively removing the Al film and removing sidewall residues from the Al film.

Allowable Subject Matter

7. Claims 1-4, 7-11, 26, 27, and 33 are allowed.
8. The following is a statement of reasons for the indication of allowable subject matter: Prior art fails to teach the step of forming a mask on the conductive film after forming the first opening, the mask having a second opening having an opening area smaller than that of the first opening and open in the first opening to expose the metallic film therefrom.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 703-306-9074. The examiner is normally unavailable reached on the First Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on 703-308-3836. The fax phone numbers

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for the organization where this application or proceeding is assigned are 703-872-9310
for regular communications and 703-872-9311 for After Final communications.

ltue

June 19, 2003


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